investigation and for the case of any quadric function of n variables, was first obtained by M. Hermite in the memoir "Remarques sur une Mémoire de M. Cayley relatif aux déterminants gauches," Cambridge and Dublin Mathematical Journal, t. ix. pp. 63–67 (1854). This solution is in my Memoir "Sur la transformation d'une function quadratique en elle-même par des substitutions linéaires," Crelle, t. l. pp. 288–299 (1855), presented under a somewhat different form involving the notation of matrices. I have since found that there is a like transformation of a bipartite quadric function, that is a lineo-linear function of two distinct sets, each of the same number of variables, and the development of the transformation is the subject of the present memoir.

V. "On some of the Products of the Destructive Distillation of Boghead Coal."—Part II. By C. Greville Williams, Esq., Lecturer on Chemistry in the Normal College, Swansea. Communicated by Professor Stokes, Sec. R.S. Received December 17, 1857.

[Abstract.]

In this paper the author describes the method adopted by him for the separation of the three classes of hydrocarbons forming the more volatile portion of the distillate. On treatment with bromine in presence of water, the naphtha is entirely converted into a heavy oil, containing the $C^n H^n$ series chemically, and propyle and benzole mechanically combined. The two latter may be removed by mere distillation on the water-bath. They are easily separable by fuming nitric acid, the benzole being dissolved while the propyle is untouched. The nitro-benzole obtained in this manner, on treatment by Béchamp's process, yields aniline mixed with a little toluidine, but no bases belonging to any other class.

The bromine compound (in consequence of its preparation in presence of water) could not be obtained free from oxygen. When kept for some time it separates into three layers, the upper being water faintly acidulated with hydrobromic acid, the middle bromine compound, and the lower, hydrobromic acid of 37 per cent., and the

density 1·320. The bromine compounds, treated successively with alcoholic potash and sodium, undergo a curious decomposition, the original hydrocarbons, from which they were derived, being regenerated. The brominated oil from the naphtha, boiling between 71° and 77°, affords hexylene boiling at 71°, and the oil from the next homologue distilling between 82° and 88°, yields heptylene boiling at 99°. The annexed Table illustrates some of their physical properties.

Physical Properties of Hexylene and Heptylene from Boghead Naphtha.

	Formula.	Boiling-point.	Density at 18°.	Density of Volume.	
				Expt.	Theory.
Hexylene	$C^{12}H^{12}$	71°	....	3·020	2·904
Heptylene	$C^{14}H^{14}$	99°	0·718	3·320	3·386

VI. "On the Electrical Nature of the Power possessed by the Actiniæ of our Shores." By Robert M'Donnell, M.D., M.R.I.A., Lecturer on Anatomy and Physiology in the Carmichael School of Medicine, Dublin. Communicated by William Bowman, F.R.S., Surgeon to King's College Hospital and the Royal London Ophthalmic Hospital. Received November 30, 1857.

After referring to the well-known phenomena manifested by electrical fishes, and to alleged instances of numbing effects, but of doubtful electrical nature, produced on the naked hand by the contact of certain marine Invertebrata, the author describes his own observations and experiments with the Actinia as follows:—

Suppose that into a vessel containing some actiniæ well expanded, and apparently on the look-out for food, some of the tadpoles of the common frog be introduced, these little creatures do not, like many freshwater fishes of about the same dimensions, immediately die; on the contrary, the salt water seems to stimulate their activity, they become very lively and swim about with vivacity. One of them may not unfrequently be observed to make its way among the tentacles of